# DCATT
# Test Plan
# Testing the Epoxy bond between the AC Flat and the Mushrooms
**3/20/98**

## Objective
The objective of this test is to establish the epoxy bond strength between the DCATT Autocollimating Flat and the nine "mushrooms" or pads that the flat will hang from.

## Test Setup
A sketch is attached that shows the parts of the test assembly. An aluminum "socket" will be fit around a Zerodur or invar mushroom. The surface of the Zerodur block and mushroom will be ground with 220-grit sandpaper. The 1.128" diameter pad of the mushroom will then be epoxied to a Zerodur glass block with either 3M 2216 epoxy or Stycast 2850 with catalyst 9. When the epoxy has cured, an aluminum "plug" will be screwed into the socket. This arrangement forms the pull test assembly, and represents the loading condition of the DCATT Hindle Mount. The Zerodur block will be clamped and the assembly will be placed into the tensile test machine. A 7/16" diameter steel screw will be inserted into the socket. Axial force will be applied to the 7/16" screw until failure of the joint occurs.

## Description of Test
This test is a standard tensile strength pull test that will be performed at Building 30 by Michael Viens/541. The assembly will be pulled until failure occurs. This process is repeated until all the test assemblies are tested.

## Variables
There are two variables that will be tested:
1. Mushroom material: Zerodur glass and Invar
2. Epoxy: 3M 2216 epoxy and Stycast 2250 with catalyst 9

## Test Matrix

| *Sample #* | *Mushroom Material* | *Epoxy* |
|---|---|---|
| 1 | Zerodur | 2216 |
| 2 | Zerodur | 2216 |
| 3 | Zerodur* | 2216 |
| 4 | Zerodur | Stycast 2850 |
| 5 | Zerodur | Stycast 2850 |
| 6 | Zerodur* | Stycast 2850 |
| 7 | Invar | 2216 |
| 8 | Invar | 2216 |
| 9 | Invar | Stycast 2850 |
| 10 | Invar | Stycast 2850 |

*This mushroom has a stem diameter of 1.025" instead of 1.128"

**Expected Strength**

The tensile strength of Zerodur is unknown, but the minimum strength for lead borosilicate glass is at least 8000 psi, so we'll use this number. According to 3M, the 2216 epoxy strength is 2500 psi. The Stycast epoxy strength is unknown, but we'll assume also 2500 psi. Since the surface area of the epoxied joint is 1 square inch, the axial force to pull to failure should be 2500 pounds. Note that two of the Zerodur mushrooms (samples #3 and #6) were fabricated with a smaller stem diameter of 1.025 inches which gives a bonded surface area of 0.82 square inches. Failure on these two samples might be expected at 2060 pounds of axial force.